A.4.20 AOC 31

Description

AOC 31 consists of petroleum impacted soils located in the vicinity of a former stream pump within Tank Basin 772. This AOC was identified during regrading activities conducted within the tank basin. Refinery personnel observed stained soils approximately 30 to 40 feet east of Tank 772, and as regrading activities continued, a cement pump pad was uncovered approximately 1.5 to 2 feet below grade. Once the pad was removed, the open excavation revealed black to dark brown stained soils from 4 to 6.5 feet bgs. PID readings obtained from soils in the excavation registered as high as 520 ppm. Visual observations of groundwater within the excavation indicated a potential impact. The final excavation required to remove the pad measured approximately 20 feet long by 12 feet wide by eight feet deep. A total of approximately 65 to 70 cubic yards of soil were removed during removal of the pad. The excavation was subsequently filled to grade.

As shown on Figure A.4.17, and summarized on Table A.4.17, data from nine borings, 14 soil samples, one monitoring well sample and two hydropunch groundwater samples have been used to characterize this AOC. In addition, relevant data from AOC 16 and PAOC 69 are also shown on Table A.4.17 for delineation purposes. During the Full RFI, 17 soil samples were collected from seven soil borings. Nine samples were analyzed for TCL VOCs and SVOCs and TAL metals, four samples were analyzed for BTEX, lead and zinc, and eight samples were analyzed for arsenic. One sample was also analyzed for SPLP metals and physical characteristics.[1]

Soil

The following table summarizes the number of samples where delineation criteria were exceeded in soil samples:

Constituents of Concern	Surface Soils (0 to 2 ft)	Fill Material (>2 ft)	Native Soils	Total
Benzene	0/5	2/4	1/4	313
Other VOCs	0/5	2/4	1/4	3/13
Benzo(a)pyrene	0/3	0/3	0/3	0/9
Other SVOCs	0/3	0/3	0/3	0/9
Lead	1/5	1/5	0/3	2/13
Other TAL Metals[a]	1/7	3/6	0/4	4/17

[a]Totals do not include naturally-occurring metal compounds in excess of the delineation criteria (Al, Ca, Fe, Mg, Mn, K and Na).

[1]Physical characteristics specified in Appendix A, Task IV of Module III of the HWSA Permit included saturated and unsaturated permeability tests, moisture content, relative permeability, bulk density, porosity, soil sorptive capacity, CEC, TOC, pH, Eh and grain size distribution.

Surface soils (0 to 2 feet bgs)

No petroleum related impacts were noted in surface soils at AOC 31; however, antimony (51.8 mg/kg), arsenic (39.8 mg/kg), and lead (1280 mg/kg) were detected above the soil delineation criteria in one of the surface soil samples (S0816A4). The concentration of arsenic (39.8 mg/kg) is well within the normal range for soils, particularly glauconitic soils in the Coastal Plain (Saunders, 2003).

Fill Materials (>2 feet bgs)

Staining, odor, and other evidence of petroleum related impacts were observed in the subsurface fill material that ranges in thickness from approximately seven feet to 15.5 feet. As shown on the above table, two of the subsurface fill samples contained benzene above the applicable soil delineation criterion at concentrations of 2.5 mg/kg and 7.1 mg/kg. These two samples also contained total xylenes at 100 mg/kg and 150 mg/kg. Arsenic (ranging from 27.9 mg/kg to 58.6 mg/kg) was also detected above the soil delineation criterion in three subsurface fill samples. These concentrations are well within the normal range for soils, particularly glauconitic soils in the Coastal Plain (Saunders, 2003).

Native Material

A clay/peat layer underlies the fill material in this part of the Refinery. In general, the clay layer is approximately seven to 15.5 feet bgs. Only minor indications of petroleum impacts were noted at AOC 31 (e.g., a minor sheen was noted at S1414 at a depth of eight to nine feet bgs). One sample (S1414E2), which was collected from this boring, contained benzene (2.4 mg/kg) and xylene (110 mg/kg) above the applicable soil delineation criteria. Although this sampling interval was formally classified as "native" on the boring log, as shown on Table A.4.17, the lithologic description for this boring indicates that alternating layers of silt, clay and sand are present between seven and 12 feet bgs, which would be more indicative of fill materials. Naturally-occurring iron was the only constituent to be detected above the applicable criteria in any of the other native soil samples at AOC 31. Therefore, with the possible exception of soils at S1414, any site-related impacts have been vertically delineated and are associated with the fill material.

Groundwater

As summarized on Table A.4.17, benzene (6,300 µg/L) and several other organic compounds and arsenic (17.7 µg/L) have been detected above the applicable groundwater criteria in the groundwater sample collected from MW-90 in May 2003. A more detailed discussion of potential groundwater impacts in the vicinity of AOC 31 can be found in Section 8 of the RFI report.

Summary

Based on the findings, exceedances of benzene (2.4 to 7.1 mg/kg) above the delineation criterion have been found within the sub-surface fill unit at soil boring locations S0815, S0817 and S1414, and metals (arsenic, antimony and/or lead) were detected in several of the fill samples from AOC 31. Assuming that the subsurface sample collected from S1414 was actually collected from the fill material and not from the underlying material, these exceedances are confined to the fill unit and have been vertically delineated. Although arsenic was also detected above the applicable delineation criterion at several locations, the detected concentrations range between 27.9 mg/kg to 586. mg/kg, which is well within the normal range for soils, particularly glauconitic soils in the Coastal Plain (Saunders, 2003). Both soils and groundwater in the vicinity of AOC 31 will be included for further evaluation in the CMS.